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NOTES ON REPTILES AND AMPHIBIANS FROM PANAMA

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This spring Mr. W. S. Brooks and I decided to make a collection of vertebrates in the hitherto unvisited Eastern Sapo highlands. From this *serrania* flow many of the tributary streams of the Sambú River in eastern Panama. Unusually early and heavy rains made this a task of more than ordinary difficulty. Our Chocoano Indian companions were anxious to plant their depleted gardens, rather than to toil as carriers in the stifling forest, and it was with considerable difficulty that they were persuaded to help us. Their consent to our plans once obtained, they proved loyal and useful allies, and our fruitful journey is the direct result of their aid. Late one afternoon in early March we were dropped off at the head of navigation on the Sambú River, just where the Sabalo enters this stream from the south. We had left Panama City on board the Panamanian schooner "Chiriquí," then under

government charter, since a chance official excursion to settle a disputed oil claim on the coast afforded us this welcome opportunity to reach the little fever-ridden Panamanian coast settlement of Garachiné near the Sambú River mouth. Thanks to Dr. R. P. Strong, who accompanied us as far as the mouth of the river, we got up the stream to Boca de Sabalo in a small motor launch towed by the schooner from Panama. After a long colloquy with the Indians, we decided to strike north to a range of hills visible from our landing place. Several hours' walk over a rough trail brought us to the Rio Esnápe, evidently a tributary of the Rio Taimití, and one which rose in the hills now near at hand. Here we collected several days, but the rains became constant and it was almost impossible to dry our collections of bird and mammal skins, and besides, reptiles were very scarce. We then recrossed the Sambú and marched overland southward to the head of the Rio Jesús, which enters the Sambú far downstream from the mouth of the Sabalo and which runs parallel to the Sabalo, but arises much farther inland. Several camps were established along this little river, and then we marched to the upper Rio Jesusito, a swift torrent, said by some to be a source stream of the Rio Celorio. The latter small river enters the sea just south of the mouth of the Sambú, nearer Garachiné point.[1] We made two camps in the foothills of the Sapo range of mountains along the Alto Jesusito. We then moved over to the headwaters of the Rio San Antonio and established a camp on the slopes of the Cerro de Sapo, a peak nearly 2,000 meters in altitude. From this point we carried down to Garachiné again and returned in a twenty-two-foot

[1] Other Indians declared that the Jesusito "has no mouth," so we inferred that it might find its way into some great marsh and not really connect with the Celorio at all.

motor launch—not without various vicissitudes—to Panama. The novelties now described have appeared during an examination of the reptiles and amphibians caught during this journey. Other notices will appear later dealing with the mammals, birds, and fishes.

The region is one of high, damp, humid forest, gloomy and stifling except where some water course cuts through the wooded lowlands, letting in the sunlight. Decay of fallen wood and leaves is very rapid and the dark forest floor is sodden and slippery. In general, reptiles were surprisingly rare, and often a day would pass when none of us would see a lizard, unless when coming to the shore of some small stream the bipedal basiliscs would scurry away. The young far outnumber the adults and all are well able to run with equal ease over land or the face of the water. While running the body is held almost upright, the tail is raised as a balance, and the fore limbs are tightly pressed to the sides. They move and stop with a speed and precision which seems mechanical rather than animate. The paucity of adults and the shyness of both young and old bespeak abundant enemies, but of what nature we were never able to learn.

One afternoon an Indian who had been gathering firewood came in carrying a small lizard, and we then saw for the first time the young of *Diploglossus monotropis,* already known from Costa Rica and Colombia. This little creature, about seven inches long, was so gorgeously colored while alive and so different from the preserved examples that my field notes are worth copying. "This specimen, seven inches long, has a grey-green head, brilliant carmine sides covered with anastomosing black lines; belly yellowish; back and tail black with beautiful narrow blue-grey, almost mauve cross-bars." I have

neer seen such a splendid lizard except my *Diploglossus resplendens* from Bolivia.

A few days after our Upper Jesusito camp was made we began to fell trees to let in sunlight and breeze. As it turned out, there was no breeze and the sun was almost constantly obscured by rain clouds. One tree came down with a crash and brought with it a living and uninjured *Corythophanes cristatus*. The interesting point in connection with this capture was the fact that we chanced to keep the lizard alive long enough to find that its actions were singularly chamaeleon-like.

It was sluggish and deliberate in its movements, and when angered it reared upright, flattened its body vertically, and bent down its head. Its mouth meanwhile was opened widely in a way that recalled at once captive and angry African Chamaeleons. That the very peculiar superficial similarity of appearance should be accompanied by such similar sluggish movements and curious attitudes is most noteworthy and almost incredible when the protean zoologic gap between the two genera is considered.

In a few places where the forest roof leaked spots of sunlight the ground did dry out and the great, curly, new-fallen leaves made noisy walking. In these little dried out spaces we found some tiny lizards. They crept swiftly and stealthily over the big dead leaves, and when the sun was hidden, as it often was because of the frequent showers, these little lizards hid at once, to reappear when their mouldy abode became dry again. They were not easy to catch, and when one was finally in the fingers a decent specimen was by no means assured, for their skin tore like wet tissue paper and their struggles usually left them sadly unfrocked.

These, as other slim-toed gekkos or Eublepharids, as they once were called, are far more agile than their allies with

dilated digits—more alert and less deliberate in their movements. When examined the species proved to be the rare and little known *Lathrogecko sanctae-martae* Ruthven.

Their color is very characteristic and varies but little. They are rich mahogany brown above and grey below. A narrow, light lateral line decorates each side and is most conspicuous on the posterior half of the trunk and fades on the basal third of the tail or does not extend so far. A conspicuous light marking shaped like a horseshoe encircles the occiput and two white lines extend from in front of the eyes to meet on the tip of the snout. The belly is immaculate, the tail reticulated and speckled below.

A considerable series was secured. The head scales afford poor diagnostic features.

The woodland Anoles were rare. One day brought to bag what is probably the giant *Anolis latifrons* Bertholdt. This lizard has a great apple-green throat fan with small, dark spots and is a striking creature in life. Previously known only by the type from Popoyan, it is easy to see how Berthold's figures may have misled Boulenger. The drawing (Verh. Ges. Gottingen 3, 1847, p. 6, pl. 1, fig. 2), where it is not frankly diagrammatic, is fairly accurate, so far as the topography of the cephalic shields is concerned, but the sculpturing is apparently not drawn in. In reality the head scales are rougher than in *A. squamulatus,* instead of the reverse as stated by Boulenger (Cat. Lizards B. M., 2, 1885, p. 62). The real character easily separating the two species is the presence in *latifrons* of a series of enlarged tubercle-like scales along the supraocular margin. In *squamulatus,* which we did not take, but which is well represented in the U. S. National Museum, the small granular scales extend from the supraocular disc to the very edge of the area over the eye, quite

without the development of any marginal tubercles. This ill-drawn figure—and the description is also perfectly vague—apparently misled Boulenger into re-naming *Anolis latifrons* as *Anolis princeps*.[2] I have seen an authentic specimen of this form in the University of Michigan Museum, thanks to Dr. Ruthven.

The most common species met with was what we consider to be *Anolis limifrons,* a slender little beast with an ivory white dewlap in life, and *Anolis binotatus,* reaching a far larger size and with the dewlap brilliant carmine enclosing a small, black, central spot. In life *binotatus* is rich olive-greenish, with dirty yellow blotches on the limbs and dark markings on the body. It has a way of resting rather flattened against bark with its legs sprawling and spread out, and the whole result of attitude and coloration is very strikingly lichen-like. The narrow dark band between the eyes and the dark perioccipital vitta are conspicuous and constant markings in life. We secured a few specimens of *Anolis stigmosus,* but the species seems much less abundant on the mainland than on the islands in the Gulf of Panama. We only found one other true Anolis which was a rather common species, having a dewlap pinkish toward the margin and dusky toward the base, if I remember correctly. Unfortunately, I omitted to make notes of this in life. After many perplexities, I have concluded that this form is so near *Anolis gaigei* Ruthven of the Santa Marta Mountains in Colombia that for the present, at any rate, our Sapo Mountains individuals had best bear this title.

Our most surprising treasure was a new genus of rather baffling affinities. The form of the body and the structure of the digits recalls true Anolis; the cephalic squamation resem-

[2] Ann. Mag. N. H., (7), 9, Jan., 1902, p. 54.

bles that of Xiphocercus, or somewhat less so of Phenacosaurus, while the scales of the body and the form and structure of the gular appendage—it is never a "pouch"—are strikingly unlike any of the Anolinae now known.

It is important also to remember that the dewlap of Tropidodactylus, which Boulenger states is "not inflatable," is really capable of being both contracted and folded so that it is decidedly similar to the dewlap of Anolis, which can also be expanded, but never, of course, "inflated." Tropidodactylus represents an Anoline stock which has become modified for fossorial life as Norops is for a purely cursorial existence. The new genus may be called

Diaphoranolis gen. nov.

Tympanum distinct; body very strongly compressed, entirely covered with juxtaposed pavement-like scales; no dorso-nuchal crest; male with a non-extensible, plicate, pendulous gular appendage covered with scales similar to those of the body; digits evenly and rather extensively dilated, with subdigital lamellae, the distal joints slender and raised as in Anolis; no inguinal pores; tail long, much compressed; it curls laterally and probably is slightly prehensile as in some Anoles, notably *homolechis;* lateral teeth tricuspid; abdominal ribs present.

Diaphoranolis brooksi[3] sp. nov.

Type: M. C. Z. 16,297, from Mt. Sapo, eastern Panama, 2,500 feet elevation; Barbour and Brooks, collectors; April, 1922. Head medium, nearly twice as long as broad; forehead very slightly concave, covered with rather large, irregular

[3] Named for my friend and frequent companion, Winthrop Sprague Brooks, Esq., of the Boston Society of Natural History.

pavement-like flat shields; supraorbital semicircles each composed of two rows of shields, the inner series of each semicircle separated from its fellow of the opposite side by two rows of small, irregular shields; occipital scale of irregular oblong shape, about as large as ear opening, separated from the semicircles by three series of rather large plates; supraocular disks large, composed of eight or ten enlarged shields in contact with scales of gradually diminishing size in the other directions; canthus rostralis rather obtuse, but sharply defined by a straight linear suture separating the enlarged canthal shields and the almost equally enlarged shields of the upper loreal row; four loreal rows below this enlarged upper series; the lowest row, however, bordering the supralabials, being also much enlarged; eleven supralabials, nine infralabials; gular appendage large, pendulous, plicate, and covered with non-imbricating, pavement-like scales similar to those on the rest of the body; body very strongly compressed, slender and delicately formed, covered entirely with flat non-imbricating, plate-like scales, so that all scales of head and body are undifferentiated in their essential features, except that those of the head are larger and polygonal, whereas on the rest of the body they are rather small, more or less similar in size, except that the ventrals are larger than either the laterals or the dorsals; the dorsals tend to be round, the laterals are all more or less oblong and the ventrals tend to be hexagonal in shape; the limbs are rather short, the adpressed hind limb reaches just anterior to the shoulder; about forty lamallae beneath the fourth toe; tail strongly compressed, the basal row of plate-like scales on each side keeled, all the rest smooth.

Color in life: Very light china bluish-grey, changing to white in alcohol, the head, neck and dewlap all similarly marked with a network of coarse black lines, two black sad-

dles on the back and nine black rings completely surrounding the tail; limbs and digits with many sharply defined pairs of fine, black lines occurring as rings which do not quite meet on the inner surface.

Total length of head and body, 132 mm.; tail, 86 mm.; head, 15 mm.

This most curious and strikingly colored lizard is now pallid white, with many black markings very sharply defined. The absence of flash colors from the pendulous dewlap and the extension out to the very margin of this appendage of the same network of markings that are so unique and surprising a feature of the head and neck is wholly unexpected. The dewlap appears more like that of Iguana in miniature. I do not believe that this type can be considered more primitive or more advanced than any of the other allied genera. Some of the Anoline genera may well have sprung from species of Anolis itself as we know it, but it seems probable that this genus sprung from some common ancestor. The expanding dewlap with a flash-color is obviously desirable, for it is widespread and shows large variety of development within the great genus Anolis itself. That type of dewlap presupposes a stylus and muscles to make expansion possible, and the necessary accommodation can only be obtained with imbricating scales on rubbery, elastic skin. The appendage in this genus, obviously also a development for purposes of ornamentation, accomplishes its more modest attempt at beautification in a wholly different manner.

Along the stream beds the diurnal and nocturnal fauna—as might be expected—differed widely. *Ameiva undulata quadrilineata* and *Ameiva festiva,* the latter with a sky-blue mid-dorsal stripe in the young and looking most scinc-like, were about equally abundant. Bufos were common, *typhonius*

and *haematiticus* along the woodland streams; the former diurnal and the latter nocturnal; *marinus* hopped about all the clearings, and a rare and rather atypical *sternosignatus* was found sparingly in the woods. *Eupemphix pustulosus* was likewise a diurnal denizen of the shady forest and many were found. *Eleutherodactylus palmatus* we took but once, and that by day. These two species were caught among the scattered stones and pebbles of the shores and beaches of the river near our camp. *Eleutherodactylus ranoides* we found several times, but with the night lamp only. *Leptodactydactylus melanonotus* was diurnal and common; the others taken were found only at night. Night hunting with the light, we often caught the great *L. pentadactylus,* and as our containers did not permit of our carrying off large series we had ample opportunity to test the remarks of good Father Labat, who remarked in 1724, when he first tasted them in Guadeloupe, that they were "les plus belles Grenonilles du Monde." By day they keep hidden in their caves and are never seen. They emerge at night and sit in the shallows awaiting their prey—usually shrimps. *Leptodactylus bolivianus,* which I once redescribed as *L. insularum,* was likewise often caught, and only after dark, unless we chanced to dig it from its deep and almost perpendicular burrow. *Rana palmipes* for some reason seemed to be distinctly rare and we only found it once.

Four species of tree toads were taken during the trip, and four only. All these were found with the aid of a hunting lamp at night. *Hyla maxima* Laur. is apparently new to the fauna of Panama and was found at the Rio Esnápe. The second species is represented by a young individual too small for satisfactory identification. The third I consider worthy of subspecific recognition.

Hyla baudinii dolomedes, sp. nov.

Type: M. C. Z. 2,39, from the Rio Esnápe, Sambú Valley, eastern Panamá. Barbour and Brooks, 1922.

Similar to true *H. baudinii* of Central America, but with very long hind limbs—longer than Central American individuals which I have seen. The tibio-tarsal articulation reaches well beyond the tip of the snout.

Boulenger (P. Z. S., 1913, p. 1,023) remarks: "One of the specimens (from the Colombian Choco), a female, is remarkable for the longer hind limbs, the tibio-tarsal articulation reaching beyond the tip of the snout." We are not informed whether the other individuals may not also have had limbs longer than normal, if less strikingly so. In any case, such frogs seem unknown in upper middle America, and even if there is overlapping as well as possible intergradation between the form it is worthy of a name for convenience. The form is probably worth full specific recognition.

The fourth species found, I believe, represents Dr. Noble's *Hyla chica*. The three examples taken agree fairly well with a paratype of *chica,* which seems to have a vastly greater range than one would expect for such a tiny form.

The species of Atelopus are at best but half known. *Atelopus varius* as now understood has a very great range, and wherever it has been collected in numbers it appears to vary greatly both individually and geographically.

This spring we camped for a week or more by a small stream, one of the headwaters of the Rio San Antonio on the slopes of Mt. Sapo. Little frogs of the genus Atelopus were common and we observed them daily. Singularly lethargic, they were usually perched on some projecting stone in midstream, and when disturbed they flopped feebly into the

water and were carried down the brook, striking out lazily until they reached some chance refuge. They were easily caught, and we preserved nearly fifty examples. This series shows almost no variation in color, also no marked structural differences from *varius,* but it lacks *the* inherent quality of *varius,* which is variability. *A. spurrelli* Boulenger (P. Z. S., 1914, p. 813, pl. 1, fig. 1) is probably related, but is known, however, from only a single specimen, so it is impossible to do more than suggest that possibly the *A. varius* stock may have given rise to some local types in the great Chocoan forest region in which a fixity of color pattern has been attained The coloration, too, is unique and striking.

Atelopus spurrelli certus, subsp. nov.

Type: M. C. Z. 8,538, from a stream on Mt. Sapo, eastern Panamá. Barbour and Brooks, 1922. Paratypes in M. C. Z. and the A. M. N. H.

Similar to *A. s. spurrelli* as described and figured by Boulenger, but with the dark dorsal areas broken up into series of spots and blotches, with, nevertheless, the underlying topography being preserved in almost every case.

The belly has a tendency to be more finely spotted in the males and almost immaculate in the females; in which sex also the dorsal dark patches are much more finely comminuted than in the males.

The creature is brick red, almost vermillion, in life, with the dark spots velvety black. In alcohol this ground color has faded to whitish on the belly and to a pallid reddish hue on the light dorsal interspace between the black blotches which have remained essentially unchanged.

Noble, after examining some of our series, declared them to be *A. varius* pure and simple, and we marvel at our own

temerity in not at once accepting his verdict. There is, however, the question of whether possibly *spurrelli* is not really as distinct as Boulenger considered it to be, and no one can doubt the close affinity of *spurrelli* and *certus*. For the present, therefore, it seems wisest to keep these various catagories separate, although there is no doubt but that very possibly adequate material might reduce both these names to be synonyms of *varius*.

The common *Dendrobates tinctorius* so abundant in the dry woods on Ancon hill in the Canal Zone and the islands, especially Taboga, near the Pacific mouth of the canal, differ conspicuously from the individuals from eastern Darien. The Canal Zone poison-toads are rich velvety black or more rarely very deep purplish maroon, with large, irregular blotches of the most vivid metallic green. The specimens from the Sambu Valley have the same dark ground color, but differ in always having the vivid green occur as small round dots about one-eighth inch in diameter and widely scattered. Such a host of color phases of *D. tinctorius* have been noticed in the literature that, until the far day arrives when material is assembled for an adequate revision, it is unwise to name the one in hand. Future collecting, to be useful, must best be done by the reviser himself that he may see in life these creatures which pass through such instant metachroses in alcohol.

To sum up, we may say that in general in this damp rain forest reptiles are surprisingly few. Amphibians, too, are far from being the abundant creatures which they often are in other similar situations. We saw but two small snakes during all our tramps, and both of these belonged to the common *Leptodeira annulata*. One fell from a small tree we cut down; the other, one of the men killed while night hunting. About the Canal Zone snakes were far more abundant.

Thanks to Mr. James Zetek and Dr. Clark, both connected with the Board of Health Laboratory at Ancon, we were not only able to have specimens brought in to the laboratory and preserved during our absence in Darien, but were given a number of specimens which from time to time had been brought to the laboratory for examination, usually to determine whether or not they were venomous.

Among the rarities so found by Brooks and myself were *Coccilia sabogae* Barbour, previously only known from the Pearl Islands. This specimen agrees well with the type and has 14 or 15 vomerine teeth, eight or nine teeth on each side of the upper jaw; eight teeth on each side of the outer row of the lower jaw and three on the inner row. The four anterior maxillary and mandibular teeth are much enlarged. This species is now to be recorded from the vicinity of Ancon.

Among the snakes, *Micrurus nigrocinctus* (Gir.) and its remarkable counterpart, *Erythrolamprus aesculapii* (Linné), caught within a few days of each other in almost the same spot and under similar conditions, offered a most graphic exposition of this ill-explained phenomenon of "mimicry." In any case, whatever may be the cause of the coloration, in both species the similarity is almost certainly purely fortuitous. *Himantodes elegans* (Jan.), known from Costa Rica and Guatemala, occurred with *H. cenchoa* (Linné) about Ancon. *Leptocalamus torquatus* Günther is another rare and little known species represented by two specimens in our Ancon collection. The ten other species secured were all common and already well known from the locality.

One novelty has, however, appeared, a single Micrurus, and one which has been carefully examined by my friend, Dr. Dunn, who is particularly interested in this genus. It is

closely related to both *M. tschudii* (Jan.) and *M. dissoleucus* Cope. It may well be called

Micrurus dunni, sp. nov.

Type: M. C. Z. 16,304, from the vicinity of Ancon, Canal Zone of Panamá.

Head only moderately depressed; diameter of eye equal to about two-thirds of its distance from mouth; rostral much broader than high, little visible from above; frontal very small, about equal to a supraocular in breadth, not twice as long as broad, and much less than its distance from the tip of the snout; one prae- and two postoculars; anterior temporal present and very narrow; seven upper labials, third and fourth entering eye and nearly equal in size, the seventh well developed; first lower labials in contact behind the symphysial; parietals very large, longer than their distance from the internasals; scales in 15 rows; anal divided; ventrals, 224; subcaudals, 19.

Color: Head black, with a narrow white band crossing the anterior portion of the parietals and sending forward extensions to the posterior border of each eye, to cover two-thirds of the frontal and the fifth and half of the sixth labial; this white ring is followed by a wide black band, then a narrower red band, and then eleven triads, on the body, in each case the central black ring being the widest, the other two black bands being equal in width to the red interspaces separating the triads and the same outer black rings of each triad about twice as wide as the red rings within the triad; these red rings also have many scales tipped with black; tail with a single normal triad and a black tip.

Total length, 130 mm.; tail, 20 mm.; diameter of body, 4.5 mm.

Micrurus hollandi (Griffin), a species recently described and one which seems to have been missed in compiling the Zoological Record, belongs also to this section of the genus. It is, however, distinct from the one now described and came from Bonda, Colombia. (Mem. Carnegie Mus., Pittsburg, 7, 3, 1915, p. 218.)